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WILDLIFE

WILD DUCKS ON FARMLAND

MAY 25 1965

CURRENT SERIAL RECORDS

in the South





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This publication supersedes Farmers' Bulletin 2144, "Managing Farm Fields, Wetlands, and Waters for Wild Ducks in the South."

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WILD DUCKS ON FARMLAND in the South

By William W. Neely and Verne E. Davison, *biologists, Soil Conservation Service*

MOST NORTH AMERICAN DUCKS have two homes—their nesting areas in the North and their wintering grounds in the South. In their wintering grounds, food is the most important requirement—food to regain energy from their flight South, food to combat cold weather, and food to return North in good condition for breeding. Ducks flock quickly to fields and ponds where food plants are grown for them.

Ducks come to almost any area covered with water but they seldom stay unless they find an ample supply of food. Although ducks do feed in dry fields, they prefer food that is underwater.

Ducks are heavy eaters. A mallard eats from 1 to 2 pounds of grain each week. One acre of land can be made to feed 50 to 100 ducks well during their stay in the South. If you want ducks, plan to feed them through the whole winter season—October to March.

You will find it is easy to grow duck food in farm fields and oak woodlands that can be flooded and in ponds and marshes. A duck field is an area kept dry to produce field crops and then flooded during the fall and winter to

make the crops available to ducks. A duck field produces more food than a duckpond or marsh.

Duck Fields

You can establish a field for ducks on a flat area below or around a farm pond, on diked bottom land or marshland, or on cropland such as rice or corn fields. Select an area that can be planted and managed to produce good duck food and then flooded with water at the right time to make this food available to ducks.

Your field will need a dike around it and a water-level control that in winter will maintain automatically any level you choose. For summer cultivation, you will need some way to drain off the water to plow depth or lower.

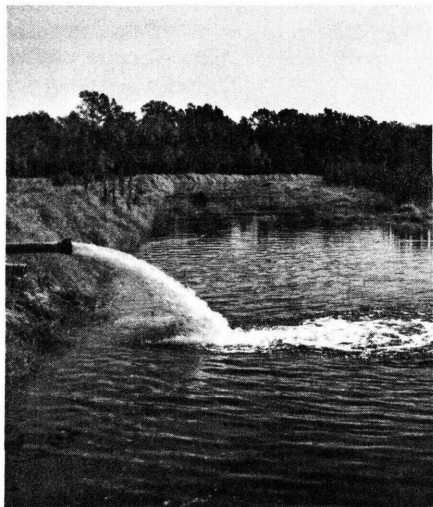
The water supply for your duck field may be stored nearby in a pond or in an irrigation reservoir. Or it may come from a well, stream, bayou, or tidal river. The amount of water available may limit the size of the duck field you can establish.

Flooding of the field can be done in several ways. Gravity-flow flooding is easy and economical. Low-head turbine



Farm fields can be diked and planted to duck food.

SC-D17-51



SC-D18-22

Water is pumped into a diked field planted to corn for duck food.

pumps are also practical. Don't depend on runoff from fall rains for early flooding. Dry Octobers and Novembers come often.

Selecting and Planting Duck Food

Some of the best plants for duck fields are browntop millet, corn, Japanese millet, and smartweed. Each of these is discussed in detail. Most of the plants that have been tried in duck fields or duck-ponds are listed on pages 4 and 5.

Browntop millet grows on soil that is dry enough to cultivate and plant in July. It must be protected from standing water during its growing season. The seed crop matures about 60 days after planting. When fertilized as needed, browntop millet yields 1,500 pounds of seed an acre. You can buy seed for planting from seed houses at low cost.

Browntop millet must be planted each year. Prepare the land by disking or plowing in early July. This midsummer preparation sets back competing weeds and grasses and the browntop millet still has enough growing season to make a full yield of seed. Earlier planting—April to June—produces excess leaves and stems and the summer-ripened seeds deteriorate before the ducks arrive. August planting is too late in the north-

ern part of the Southeast but is all right in Florida and the southern half of Louisiana, Mississippi, Alabama, and Georgia.

Plant 20 pounds of browntop millet seed per acre. Drill the seed $\frac{1}{2}$ to 1 inch deep or broadcast and cover with a drag. Apply at least 500 pounds of 5-10-10 fertilizer or its equivalent per acre.

Browntop millet also attracts black-birds, cowbirds, doves, and sparrows. If large flocks of these birds appear, flood the planting as soon as possible after it matures.

Corn is grown for ducks the same way it is grown for other uses. Plan for a yield of at least 60 bushels per acre. Plant the best varieties and cultivate and fertilize as recommended for high production in your locality. Corn needs deeper drainage than any of the other duck foods discussed here.

After the crop is made, leave it standing and flood it. You may need to harvest a small area to provide open water if there is none in or alongside the stand-



SC-D18-21;
SC-D18-20

Browntop millet and corn are planted in this field. Then the field is flooded to make the food available to ducks (bottom).

ing corn. During the winter the corn falls over progressively into the water. Ducks will eat every grain from every ear—whether the corn is underwater, on the surface of the water, or hanging 8 to 10 inches above the water. Sometimes they will feed on unflooded corn growing near the pond.

It is illegal to attract ducks for hunting by dragging or mowing down the corn or by shucking or shelling it. Any one of these would be considered baiting.

Japanese millet is an improved variety of barnyard grass and is widely adapted to wet soils from California to the Atlantic coast. In fact it grows on soils wetter than browntop millet and corn will tolerate. It even grows in shallow water. Japanese millet volunteers and grows as a weed in ricefields.

The name "wild millet" or "duck millet" is often used to include all species of *Echinochloa*—barnyardgrass, the cockspurs (Coast, Florida, and Gulf), Japanese millet, and junglerice. All are eaten by ducks.

Plant Japanese millet in July or early August in the Deep South. The seed crop matures in 60 to 100 days. Seed and fertilize it as you would browntop millet. You can buy Japanese millet from commercial seed dealers.

Japanese millet deteriorates a little faster than browntop millet. Like browntop millet, it attracts blackbirds.

Flood the planting as soon as possible after it matures if large flocks of blackbirds appear.

Smartweeds are adapted to sites wetter than those for browntop millet or even Japanese millet. There are several moderate-yielding varieties — dotted smartweed, Pennsylvania smartweed, and swamp smartweed.

The chief disadvantages of smartweeds are that very little seed is available commercially and that seeding methods are not well known. But smartweed seeds are present naturally in most wet areas and you may need only to disturb the soil enough to germinate seed and control competing weeds to get a stand.

You can also establish smartweeds by transplanting wild seedlings or rootstocks. Do this in the spring. Space plants 2 to 3 feet apart. Keep the soil moist; in fact, it is best to plant in saturated soil. A few dozen plants will produce a stand in a few years.

You can favor smartweeds by burning the field in early spring as soon as you can drain off the water. Burning followed by light disking is even more effective. Or you can disk alone where burning is a hazard. Another way to improve a stand of smartweed is to graze it moderately in spring and summer. Grazing reduces competition from plants that livestock like better than the peppery-tasting smartweeds.



SC-D17-52

Japanese millet is suitable for wet soils.

Evaluation of some duck-food plants

[Plants best for management in duck fields, woodlands, marshes, or duckponds are marked with an asterisk]

<i>Kind of plant or seed</i>	<i>Comments</i>
*acorns-----	Good food for mallard, black duck, and wood duck. Management practices well established (p. 7).
*aneilema-----	Good food for mallard, black duck, and pintail. Although seed is not likely to become available commercially, aneilema can be managed where it occurs naturally to produce excellent duck fields. Drain the field in late February. Burn and disk as soon as possible after draining. Keep soil wet during spring and summer. Aneilema requires partial shade, which is furnished by native marsh vegetation.
arrowhead (duckpotato)-----	Seldom used by ducks. Destroy to favor better foods.
arrowhead, delta-----	Good food for canvasback, gadwall, mallard, pintail, and ring-necked ducks. Limited to lower Mississippi Gulf coast area where it is adapted to mud flats and shallow water.
barnyardgrass-----	Good duck food. Well adapted to wet soils. Good stands often occur under natural conditions. Seed available commercially. Use the improved variety, Japanese millet.
buckwheat-----	Good duck food. Does not produce well in the Deep South. Seeds deteriorate rapidly underwater.
bullgrass-----	See paspalum, bull.
bulrush, Olney-----	Important duck food only in natural marshes of Louisiana and other Gulf States (p. 12).
*bulrush, saltmarsh-----	Best duck-food plant for a managed duckpond in the salinity range of 3,000 to 10,000 p.p.m. salt. Management practices well established (p. 12).
bushy pondweed-----	See naiad.
chufa-----	Good food for mallards, mottled ducks, and pintails. Raccoons may destroy planting.
cockspur-----	Good duck food. Good stands often occur under natural conditions. Coast cockspur tolerates medium salinity.
*corn-----	Good food of most wild ducks. Requires good soil, deep drainage, fertilization, and cultivation (p. 2).
cowpeas-----	Not an important duck food. Seeds deteriorate rapidly underwater.
duckweed-----	Does not attract ducks even when abundant. Shades out submersed duck-food plants.
eelgrass-----	Requires a water current; therefore is not adapted to duckponds.
flatsedge, redroot-----	Good duck-food plant in Gulf States. Management practices undetermined.
junglerice-----	A good duck food that grows as a "weed" in ricefields. Similar to barnyardgrass and cockspur.
*millet, browntop-----	Good duck food. Probably best all around plant for duck fields. Management practices well established (p. 2).
millet, foxtail-----	Good food of mallards, pintail, and other ducks. Non-game bird competition continues even after flooding, as many of the seed heads remain erect and out of the water. Soil adaptation, planting, and management same as for browntop millet but produces only about one-half the seed yield of browntop millet.
millet, German-----	See millet, foxtail.
*millet, Japanese-----	Good duck food. Produces high yields of seed. Available commercially. Can be grown on soils too wet for browntop millet. Can also be seeded directly on wet flats after a drawdown (p. 3).
millet, wild-----	A name used to include all species of barnyardgrass, the cockspurs, Japanese millet, and junglerice.

muskgrass_____	Fair food for ducks. Requires alkaline water. Is said to give an undesirable flavor to the flesh of ducks.
*naiad_____	Fair duck food adapted to fresh-water duckponds in a wide range of localities. Naiad and the potamogetons are often crowded out by useless plants (p. 7).
panicum, fall_____	The small seeds of this native grass are good duck food but they are quickly lost in the accumulated plant litter unless the field is burned each spring. Natural stands of fall panicum are easily maintained by (1) winter flooding, (2) late March or April drawdown, (3) burning as soon as dry, and (4) moist soil conditions until fall.
paspalum, bull_____	A fair duck food that occurs as a "weed" in some planted duck fields. Probably not worthwhile to manage.
potamogeton_____	A few species of this large group of fresh-water pondweeds furnish fair food for ducks. Often they come into a pond without being planted.
*potamogeton, sago_____	Fair duck food. One of the better plants for fresh-water duckponds but requires water with a methyl-orange alkalinity greater than 50 p.p.m. Grows also in brackish water (pp. 8, 10).
redroot_____	High yield of good food for mallard, black duck, and pintail. Habitat is limited <i>either</i> to peat soils <i>or</i> to wet sands high in organic material. Stands can be maintained and increased on organic sands by disking after drawdown in early spring. Management for undiked peat areas includes level ditching and use of fire to burn out shallow potholes.
rice_____	Good duck food. Keeps well underwater. Waste grain in rice fields flooded after harvest important as a duck food. If planted for ducks and left standing, blackbirds and bobolinks eat most of the seed.
sawgrass_____	Although eaten by many species of ducks, the extremely hard seeds of this plant are almost indigestible and serve principally as grit.
*smartweeds_____	Good duck food. Well adapted to wet soils. Seed yield moderate. Excellent keeping qualities when flooded. May be grazed in summer (p. 3).
sorghums (hegari, combine milo, etc.)_____	Good duck food but not suitable for planting in southern duck fields. Blackbirds and sparrows eat most of the seed before the ducks arrive. Humid conditions cause rapid deterioration from mildew.
soybeans_____	Only a fair duck food at best. Deteriorates rapidly underwater, making it impractical to plant for duck food.
spikerush, dwarf_____	Fair duck food that grows in brackish-water ponds with widgeongrass and saltmarsh bulrush (p. 10).
spikerush, squarestem_____	A fair, but low-yielding, duck food adapted to shallow edges of fresh-water ponds.
tearthumb (2 species)_____	Related to the smartweeds. Grows on the higher elevations of marshland soils. Although good duck food, seed yields low and not worthwhile to manage.
waterlily, banana_____	Very difficult to establish; few sources of planting stock. Requires alkaline water or slightly brackish water.
*watershield_____	Fair food for ring-necked ducks. Grows in acid and organic-stained waters (p. 7).
*widgeongrass_____	Good duck food. Simple and easy to grow in brackish water. With proper water salinity, there is little or no competing vegetation. Management practices well established (p. 10).
wildcelery_____	Not generally adapted to duckponds. Grows best on sandy-bottom lakes or in streams with a slow current.
wildrice_____	Good duck food but is not adapted for plantings in southern duck fields and duckponds. Grows in slightly brackish water. Bobolinks, blackbirds, and sparrows eat most of the crop in the South.

The stems of smartweed and many other duck-food plants accumulate heavily on the ground in a year or two. This trash makes it difficult for ducks to feed. Burn or disk it each spring when it is dry enough. Burning is cheaper than disking but is a hazard to peat soils and to woodland or pasture nearby.

Managing Water

Duck fields are flooded after the seed crop matures—usually late October. A depth of 1 to 15 inches is correct for ducks that “tip” to feed—black duck, gadwall, mallard, pintail, shoveler, teal, widgeon, and wood duck. *These ducks cannot reach food easily if you flood the field deeper than 15 inches.* In fields where the high point is more than 15 inches above the low point, raising the water level a few inches at a time makes it possible to have fresh food available through winter and into spring.

Diving ducks such as canvasback, red-head, ring-necked, and scaup can feed easily in several feet of water.

To send the ducks back strong, keep water on the field until they fly North again—March or early April.

Eradicating Marsh Vegetation

The marshland you plan to convert into a duck field may have heavy growths of giantcutgrass, cattails, maidencane, or reed. These plants are often hard to destroy. This is particularly true where the soil cannot be drained enough to support tractors for disking or plowing. You can kill these marsh plants in 2 years if you have dikes high enough to flood them continuously to a depth of 3 feet or more. In most marshland, however, high dikes are too expensive.

Usually you can destroy heavy growths of giantcutgrass this way: (1) Drain the field as completely as possible; (2) mow it in late July or early August; (3) burn the field when the hay is dry (after 2 or 3 weeks); (4) flood the field immediately, as deep as your gates will permit; and (5) keep it flooded until the following spring. By then the cutgrass will be virtually eradicated, and you can drain the field and grow one of the better duck foods. In a large field, leave some scattered strips or plots for natural blinds and cover.

Draining, plowing, and cultivating will get rid of cattails. Or if you have brackish water nearby, flood your cattail marsh and convert it to a widgeongrass pond.



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Ducks eat waste grain and grass seeds when ricefields are flooded after harvest.

There are chemical sprays that will kill most heavy marsh plants. But the dense growth makes treatment by airplane or airboat necessary and it is usually expensive. It is better to spend your money on water control and drainage so that machinery can be used to disk or plow the field.

Flooding Ricefields After Harvest

Waste rice and grass seeds such as paspalums, panicums, barnyardgrass, and junglerice can be made available to ducks if you flood your ricefield during winter. This is an important opportunity since 100 to 200 pounds of food are usually available on each acre. Such fields are most attractive to ducks when an acre or two of rice stubble is disked down to make an open water area.

Flooded Oak Woodlands

Acorns are a preferred food of black ducks, wood ducks, and mallards. If you dike and flood several acres of oak woodland with shallow water (1 to 15 inches or more), you get good duck hunting in addition to the wood products. Flood the woodland only during the winter. If you flood it year round, you kill the trees.

You can also make clearings and plant them to browntop millet, Japanese millet, or smartweed. Food in these openings make an additional attraction for ducks.

You get more acorns from oak trees if you remove competing trees. Remove undesirable trees, brush, and bushes from your woodland duckpond when your farm labor is not pressed with other work.

The water-control gate of your woodland duckpond should be large enough—and kept open—to avoid impoundment of water in summer. To dispose of peak flows, you need emergency spillways at one or both ends of the dike. Close the gate the last of October and allow the area to fill and remain flooded until March. Winter flooding favors the growth of commercial hardwood trees.

Fresh-Water Ponds

Your farm may not have enough flat land for a duck field. Or the only low-



ARK-62, 242

In winter, diked flat areas of oak woodland can be flooded for duckponds.

lying areas may not have an outlet for draining. If so, you can build a freshwater pond and grow aquatic duck-food plants. You can request planning or design assistance from the Soil Conservation Service (SCS) through your soil conservation district.

Aquatic Duck-Food Plants

Fresh-water duckponds are more difficult to manage than duck fields. This is true because the conditions that grow aquatic duck-food plants are ideal for many kinds of worthless plants. Acid, organic-stained, muddy, or low-calcium water may not support aquatic duck foods.

Watershield is adapted to many waters—even those that are mildly acid or have some organic stain. It is a fair food for diving ducks such as ring-necked. Naiad and southern naiad are fair duck foods and easily grown. Several species of potamogeton are good duck foods. If the water in your pond is suitable, any or all of these “pond-weeds” may appear and spread rapidly without your planting them. Or, most likely, you can get a few plants from a



GA-D8-166

When beavers seal the three-log drain in the fall, the pond refills and the flooded plantings produce good duck hunting.

local fishpond whose owner considers them pest plants that interfere with fishing.

One of the better duck-food plants for a fresh-water pond is sago potamogeton, but it will grow only in alkaline waters (see also "sago" on page 10). Before you attempt any expensive planting or management of sago, have the water tested for alkalinity by the methyl-orange method. Water that has less than 50 parts alkalinity per million parts of water will not grow sago.

Muskgrass is a fair duck food that will grow in alkaline water. You may not want it in your duckpond; some think it produces an undesirable flavor in the flesh of ducks that eat it.

Waterlilies, spatterdock, parrotfeather, bladderwort, watermilfoil, and many other aquatic plants are worthless to ducks and may invade your fresh-water duckpond. Eventually, they can choke out most of your duck foods. Control measures include treating the entire pond with a herbicide to kill waterlilies and all submersed plants including the duck foods—then reintroducing the duck-food plants—or draining the pond and using it for crops or pasture for a few years.

Beaver Ponds and Ducks

Growing duck food in beaver ponds is easy and inexpensive. Lower the ponded water in June or July by making a break in the beaver dam. Then, place a 3-log drain in the break to allow continuous drainage. The beavers seldom close this kind of drain until late September or October. If they do, it takes only a few minutes to open it again. Thus you have at least 60 days to grow a crop of Japanese millet.

Seed Japanese millet by broadcasting it on the wet soil immediately after the dam is broken. Fertilize the planting as you would browntop millet.

If the beavers fail to close off the water in late September or early October, remove the 3-log drain.

Fishponds and Ducks

You will find it difficult or impossible to grow duck food in good fishponds because they have deep edges and are managed to prevent growth of waterweeds. Submersed aquatic plants will spoil a fishpond. More practical is a duck field on flat land below a fishpond where it can

be flooded in the fall with water from the pond.

If you have a pond with shallow water at its edges and upper end, draw the water down 2 or 3 feet in July. Without any soil preparation, broadcast Japanese millet on the exposed wet area. Raise the water level in October to produce desirable duck-feeding conditions. You can control willows and other woody plants with 2,4-D or 2,4,5-T spray; these have no effect on the millet.

Caution: If you use herbicides, apply them only when needed and handle them with care. Follow the directions and heed all precautions on the container label. If herbicides are not handled or applied properly, or if unused portions are disposed of improperly, they may be injurious to humans, domestic animals, desirable plants, honey bees and other pollinating insects, fish or wildlife, and they may contaminate water supplies.

Reservoirs and Ducks

Ducks frequently rest on irrigation, industrial, and municipal reservoirs, but

these waters seldom produce duck food of any consequence.

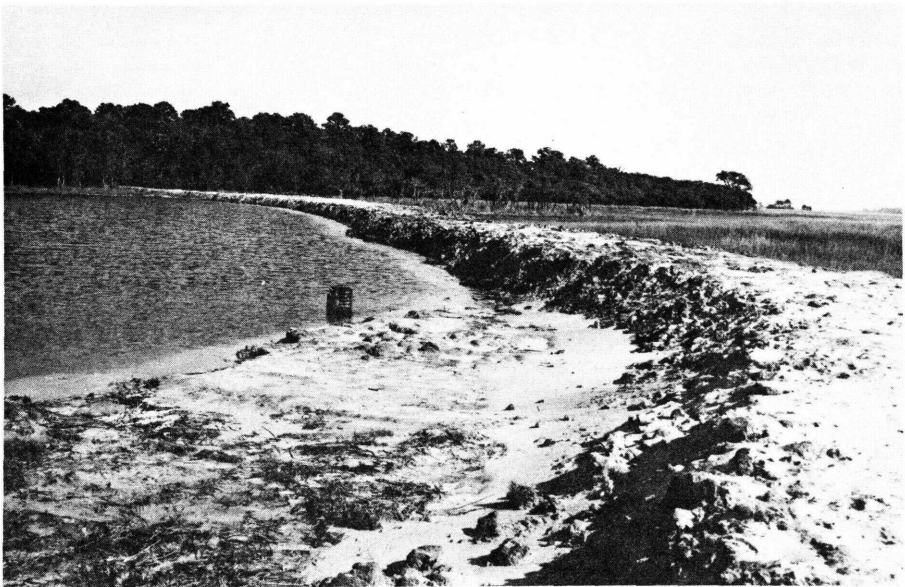
In Arkansas, Louisiana, and Mississippi—particularly in the rice-growing areas—landowners build reservoirs by leveeing around a flat area. They pump these reservoirs full in winter and spring and use the water for irrigating rice, cotton, and other crops in summer.

Irrigation reservoirs impounded on bottom land where oak trees are left standing attract ducks the first and second winters. After the first year the trees stop producing acorns. In about 3 years they die from having water around them through spring and early summer. The dead trees provide neither food nor cover and the reservoirs lose most of their attractiveness to ducks.

Brackish-Water Areas

Sites for making excellent duckponds at reasonable cost are common in coastal salt marshes. Such sites are not suitable for cropland, tame pasture, or woodland.

These salt marshes have a heavy growth of needlerush or cordgrass, both of which are almost worthless for ducks. You can replace them with widgeongrass or



SC-D21-47

Coastal salt marshes can be diked for brackish-water duckponds.

saltmarsh bulrush, depending on the saltiness.

Sago potamogeton is a brackish-water plant that is a good duck food but is difficult and uncertain to manage. It grows best at the same salinity as tropical cattail and other undesirable plants for ducks. Saltier water usually keeps these pest plants out.

Dwarf spikerush is a fair food for ducks. It tolerates a wide range of salinity and does not seriously compete with either widgeongrass or saltmarsh bulrush. But it is not important enough to manage. Ducks pull it up and eat the roots, then leave the tops floating on the surface of the water. Rafted masses of these floating tops are often found on the downwind edge of a pond.

Widgeongrass Ponds

Widgeongrass is a preferred food of many ducks—black duck, gadwall, green-winged teal, oldsquaw, redhead, ruddy duck, scaup, shoveler, and widgeon. Ducks eat the seeds, leaves, stems, and even the roots of this plant.

Widgeongrass is best suited to areas where the salinity is at least one-third that of ocean or Gulf waters—about 10,000 parts of salt per million parts of water or 1 percent salinity. The presence of certain native plants often indicates the best locations for widgeongrass ponds. In tidal areas, these locations have *solid* stands of needlerush or smooth cordgrass.

Widgeongrass survives in water much saltier or fresher than 10,000 parts per million so you need not worry about keeping the salinity in a narrow range.

For a widgeongrass pond, select an area you can enclose with a dike. You will want a water depth of at least 2 feet. You can get help with your site and design problems from the SCS conservationist through your soil conservation district.

In choosing a location for the dike, try not to cross tidal creeks, runs, or sloughs. They usually have soft bottoms that make them difficult to fill. The dike should be at least 3 feet above the impounded water level. A dragline is the common equipment for making the fill. Some-



SC- D21-48

A prefabricated water-control structure like this is an easy way to control water levels in a duck field. An asphalt-coated corrugated metal pipe that runs through the dike is attached to the riser.

times soil can be hauled from adjacent high ground.

You need not remove the marsh vegetation inside the pond basin before impounding water. Although needlerush and cordgrass thrive with the daily ebb and flow of the tide, a constant depth of 2 feet or more kills them quickly and they disintegrate.

Water level is best controlled with a flashboard riser. Prefabricated structures are available from several manufacturers, and you may find them more economical than building your own. One type has an asphalt-coated corrugated metal pipe that goes through the dike and is attached to a riser with flashboards.

A brackish-water pond in coastal areas needs a wide spillway to protect it against storm tides so that the water level inside the pond can quickly rise or fall with the level outside. Therefore, if the storm tide rises higher than the dike, no break-

age or backwashing occurs. When the tide recedes, the water lowers to the level set by the top flashboard.

Filling the pond and maintaining the water level are easy. Place flashboards in the riser at normal high tide to hold the water at this level. The highest tides then spill over into the pond. This keeps the pond at maximum level and recharges it occasionally with salt water.

If the pond becomes too fresh—as shown by growth of fresh-water plants, by poor growth of widgeongrass, or by testing—take off one of the flashboards. This allows salt water to flow into the pond every day during normal high tides. You can safely let this extra salt water flow in for 3 to 4 weeks.

Where there is not enough tidal fluctuation to fill your pond, pump to fill it and recharge the salinity. The low-head turbine pumps used for flood irrigation and drainage are well suited for this. After the pond is filled, pump in water only when necessary to replace losses from seepage or to recharge the salinity.

Planting widgeongrass may not be

necessary as it will appear in most brackish-water ponds without planting it. A few bushels of plants raked out of a neighbor's pond or purchased from an aquatic nursery and scattered over the water will get it started. Any season of the year is suitable for planting, but spring is best because of the longer growing time. Growth and spread are so rapid that by fall your pond should have extensive beds of widgeongrass growing from the bottom to the surface of the water. Do not be alarmed if a heavy concentration of ducks apparently eat all the widgeongrass. There will be plenty of seeds and roots for the next year.

To protect widgeongrass against a smothering growth of filamentous algae (*Cladophora*), stock your pond with mullet—a native fish that eats the algae. Let off some of the water in the pond and refill it during high tides when schools of fingerling mullet are noticed in nearby creeks. They will be flushed into the pond with the incoming water. Or the fingerlings can be netted and released in the pond.



SC-D21-56

Marshes need water-level control to grow desirable duck-food plants. Flapgates can let water flow into the marsh or keep tidal water out.

Saltmarsh Bulrush Ponds

If your marsh is too salty for fresh-water plants but not salty enough for widgeongrass, then saltmarsh bulrush is the best duck food to grow. You can often tell the salinity of these "intermediate" range marshes by the native plant growth. They frequently have a mixed stand of several salt-tolerant plants rather than solid stands of needlerush or smooth cordgrass. Salinity of such marshes ranges from 3,000 to 10,000 parts per million.

Saltmarsh bulrush is a sturdy perennial plant 3 to 4 feet tall. It produces a heavy crop of brown seeds in conelike heads. Seed deterioration is slight even after several months.

Saltmarsh bulrush ponds do not need to be so deep as widgeongrass ponds. A few inches of water is enough. Choose a site that can be enclosed with a dike and can get brackish water either from tidal flow or from a pump.

Water-level control is the secret of successfully growing saltmarsh bulrush. In tidal areas, a flashboard riser in the pond and a flapgate on the outside end of the pipe can be adapted to permit the needed fluctuation. Your SCS conservationist can help with the design of such a water-control device.

Water-fluctuation cycles favor the growth of saltmarsh bulrush and discourage competing plants. During the spring, summer, and early fall, lower the water level in the pond gradually from about 8 inches down to a saturated soil condition and then raise it again. Do this for 4 to 6 weeks for each complete cycle. During the winter months, maintain the water depth at about 12 inches for the best duck feeding.

As with widgeongrass, planting saltmarsh bulrush may not be necessary. Usually, seeds are present in brackish marshes and germinate readily when the water level is fluctuated.

If saltmarsh bulrush does not appear after the first or second water-fluctuation cycle, you will need to introduce it into your pond. A few plants—transplanted preferably in the spring—are all you need to get saltmarsh bulrush started. Spread

is so rapid you can expect a stand in a year or two.

Marshland

Contrary to popular opinion, most natural marshes furnish little food for ducks. But you can manage them to produce more duck food than they naturally do. Managed marshes seldom produce as much food per acre as planted duck fields, but the vastness of marshes in coastal areas makes them important for duck-food management.

Open-water areas attract ducks to marshes. You can make them by grazing, burning, or mowing or by mashing down vegetation with a marsh buggy.

The following practices, alone or in combination, improve marshland for wild ducks:

Grazing the marsh enough to open up the grass cover and make room for desirable duck-food plants such as smartweed. Barnyardgrass or coast cocksbur will come into fresh-water marshes if you remove cattle by July.

Giantcutgrass, common reed, and maidencane (called "paille fine" in Louisiana) usually dominate fresh-water marshes. They are not good duck foods. They are, however, nutritious grazing plants for cattle and cattle prefer them to the duck-food marsh plants.

In brackish and salt marshes that lie above normal daily tides, seashore paspalum, cordgrasses, saltgrasses, and reed dominate. Grazing reduces these poor duck-food grasses and favors such duck foods as Olney bulrush and saltmarsh bulrush.

Burning is useful in managing marshes for ducks (also for geese and muskrats). Like grazing, burning can be used to reduce coarse, perennial marsh plants and to create favorable conditions for growing natural duck foods. Dead stems and blades of previous years' growth gradually fill a marsh. This debris eliminates open water and makes feeding difficult or impossible. Burn it at least every second year in winter or spring.



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Open water attracts ducks to fields and marshes.

Control of water levels can help. A low levee can be built to hold 2 to 12 inches of water on some natural marshes. Gates in the levee—and pumps where necessary—hold, lower, or raise the water level to favor smartweeds and cockspur.

Hunting Suggestions.

You manage your ponds and flooded fields or woodlands for ducks because you want to hunt or to see them. But how can you enjoy hunting and still encourage ducks to stay on your farm?

Remember, food is their chief attraction. A resting place is important but secondary to food. The time of day you hunt and the frequency of your hunting are significant if you want the ducks to return each day.

Sundown-to-dark shooting almost always frightens ducks away for the rest of the year. Even late afternoon shooting usually causes fewer ducks to use your field. Early morning shooting—in keeping with legal shooting hours—

least disturbs duck flocks. When the shooting stops, the ducks can return safely to the feeding area and be unmolested the rest of the day.

You learn by experience how often you can shoot without driving the ducks away from your food, water, and resting areas. On large woodland duckponds, where shooting in one area never frightens all the ducks away at one time, you can shoot more often than on small duck fields and ponds.

Sometimes half as many ducks are lost by crippling as are killed and recovered by hunters. To reduce this waste, don't shoot at ducks out of range. A 12-gage gun with high-velocity loads kills ducks at 120 feet and less. A 16- or 20-gage shotgun usually cripples more ducks than it kills if the ducks are more than 100 feet away.

Everyone likes to see ducks feeding and resting. You and many of your guests may get your greatest pleasure from just watching or photographing them.

Common and Scientific Names of Plants Mentioned

aneilema	<i>Aneilema keisak</i>
arrowhead	<i>Sagittaria</i> spp.
arrowhead, delta	<i>Sagittaria platyphylla</i>
barnyardgrass	<i>Echinochloa crusgalli</i>
bladderwort	<i>Utricularia</i> spp.
bulrush, Olney	<i>Scirpus olneyi</i>
bulrush, saltmarsh	<i>Scirpus robustus</i>
cattails	<i>Typha</i> spp.
chufa	<i>Cyperus esculentus</i>
cockspur, coast	<i>Echinochloa walteri</i>
cordgrass	<i>Spartina</i> spp.
cowlily, spatterdock	<i>Nuphar advena</i>
duckpotato, see arrowhead	
duckweed	<i>Lemna</i> spp.
eelgrass	<i>Zostera marina</i>
flatsedge, redroot	<i>Cyperus erythrorhizos</i>
giantcutgrass	<i>Zizaniopsis miliacea</i>
junglerice	<i>Echinochloa colonum</i>
maiden cane	<i>Panicum hemitomon</i>
millet, browntop	<i>Panicum ramosum</i>
millet, foxtail	<i>Setaria italica</i>
millet, Japanese	<i>Echinochloa crusgalli</i> var. <i>frumentacea</i>
muskgrass	<i>Chara</i> spp.
naiad, northern	<i>Naias flexilis</i>
naiad, southern	<i>Naias guadalupensis</i>
needlerush	<i>Juncus roemerianus</i>
panicum	<i>Panicum</i> spp.
parrotfeather	<i>Myriophyllum</i> spp.
paspalum	<i>Paspalum</i> spp.
paspalum, bull	<i>Paspalum boscianum</i>
paspalum, seashore	<i>Paspalum vaginatum</i>
pondweed, see potamogeton	
potamogeton	<i>Potamogeton</i> spp.
potamogeton, sago	<i>Potamogeton pectinatus</i>
redroot	<i>Lachnanthes tinctoria</i>
reed	<i>Phragmites communis</i>
sago, see potamogeton, sago	
saltgrass	<i>Distichlis</i> spp.
sawgrass, Jamaica	<i>Cladium jamaicensis</i>
smartweed, dotted	<i>Polygonum punctatum</i>
smartweed, Pennsylvania	<i>Polygonum pennsylvanicum</i>
smartweed, swamp	<i>Polygonum hydropiperoides</i>
spikerush, dwarf	<i>Eleocharis parvula</i>
spikerush, squarestem	<i>Eleocharis quadrangulata</i>
tearthumb	<i>Polygonum arifolium</i> and <i>P. sagittatum</i>
waterlilies	<i>Nymphaea</i> spp.
waterlily, banana	<i>Nymphaea mexicana</i>
watershield	<i>Brasenia schreberi</i>
widgeongrass	<i>Ruppia maritima</i>
wildcelery	<i>Vallisneria spiralis</i>
wildrice	<i>Zizania</i> spp.